

CHERMIDÆ FROM UTAH, NEVADA, AND ARIZONA,
INCLUDING THREE NEW SPECIES
(Homoptera)

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The specimens on which the following article is based were collected by Mr. E. W. Davis, United States Bureau of Entomology, Richfield, Utah, and were received through the courtesy of Mr. P. N. Annand, Sugar Beet Insect Investigations, United States Bureau of Entomology.

Incidental to other work being carried on by Mr. Davis fifty-five separate collections were made by sweeping twenty-three species of host plants¹ in southern Nevada, southwestern Utah, and northwestern Arizona between April 20 and June 21, 1930. The entire collection includes approximately twelve hundred specimens representing four of the six subfamilies recognized by Crawford: namely, the Liviinæ, Pauropsyllinæ, Triozinæ, and Psyllinæ. Three of the fourteen species represented are apparently undescribed and three of them are here undeterminable because of insufficient and fragmentary material.

One or more slide mounts of cleared and stained specimens have been prepared for each species represented. In several instances where the material was limited my preference has been to mount the available material on slides for detailed study with the compound microscope rather than to rely on unmounted specimens in making determinations. For most of the species specimens for making other mounts are available.

The writer has undertaken an extensive study of the Chermidæ and is interested in receiving specimens from any part of the world for identification. With few exceptions the immature stages of the Chermidæ are little known. Material including nymphs and a sufficient number of adults to establish the identity of the immature stages will be especially appreciated. Types of the new species are in the author's collection.

¹ A statement of the writer's viewpoint relative to the host plants of the chermids and an evaluation of the several methods of collecting commonly employed will be found elsewhere (1930, Klyver, F. D., Notes on the Chermidæ. Part I. Canadian Entomologist, 62:167-168).

Subfamily LIVIINÆ

Genus APHALARA Forster

Crawford's opinion that this genus contains a large number of closely related and probably intergrading species is substantiated by my observations on numerous specimens included in the collection. My observations, furthermore, confirm his statement that the size and color of the body, the presence, absence or degree of maculation or coloration of the fore wing, and the size of the genital segments are subject to considerable variation even within single species. On the other hand, my specimens definitely indicate that there are other characters, usually disclosed only in *properly cleared, stained, and mounted specimens studied with the compound microscope*, which are more significant and of greater utility in separating the species than are the admittedly variable characters mentioned above. These other characters are: (1) the morphology of the forewing and hind wing, that is, the character of the wing membrane, the presence or absence and distribution of setæ, punctations and alar radulæ,² and the character of the venation of the hind wing; (2) the shape or form and detailed structure of both the male and female genital segments; (3) the comparative size of the anal valve or proctiger and the forceps or claspers of the male; (4) the shape or form of both the proctiger and the claspers of the male; and (5) the presence or absence of, the exact form of, and the location or distribution of the various types of setæ, spines, hooks, and chitinized ridges or folds that characterize the male and female genitalia in this group. In addition to these characters the ovipositor of the female is itself frequently distinctive.

Relying chiefly on these latter characters, the numerous specimens at hand, obviously agreeing very well with the characters of the genus *Aphalara*, have been assigned to eight species. One of these, *Aphalara pulchella* Crawford, is apparently subject to few variations and is easily recognized. An-

² Ferris, G. F., and Klyver, F. D. Report Upon a Collection of Chermidæ (Homoptera) from New Zealand. New Zealand Journal of Technology. In press.

other species, *A. suaedæ* Crawford, is, on the other hand, apparently subject to wide and significant variations. It is of special interest here because of the bearing my observations have on the group of species centering around *A. artemisiæ* Forster. Two apparently undescribed species of this genus which are represented by sufficient material are here described as new.

APHALARA SUAEDÆ Crawford

Fig. 1, A, B, C, D, H

1914, *Aphalara suaedæ* Crawford. U. S. Nat. Mus., Bull. 85:31; fig.

Specimens. Over 350 adult males and females and three last-stage nymphs from *Dondia nigra* (Raf.), Overton, Nevada, May 2, 1930 (311³); nine males and females from the same host, Las Vegas, Nevada, May 2, 1930 (316); three males from the same host, Las Vegas, Nevada, May 3, 1930 (322); many males and females from the same host, Glendale, Nevada, May 2, 1930 (303); three females from *Covillea tridentata* (D. C.), St. Thomas, Utah, May 2, 1930 (309); one male from *Atriplex hastata* L., Logandale, Nevada, May 2, 1930 (304).

Length to tip of folded wing, 1.6-2.2 mm.; length of body mounted on slide, 2.5 mm.; length of fore wing, 1.4-1.8 mm.; width of fore wing, .6-.8 mm.; width of head, .5-.75 mm.

Comparisons of specimens of this long series with many specimens taken by the writer from *Suaeda moquini* Greene, east of Altamont Pass, Alameda County, California, and from the same host at several localities in the San Joaquin Valley, California, point to their being identical. The fact that the three nymphs listed above are also apparently identical with numerous fifth-stage nymphs taken in the Altamont Pass collections, together with the rest of the life history of the species, is further and conclusive proof of the identity of the specimens in the Davis collection.

It is exceedingly interesting, furthermore, that the numerous specimens before me apparently include all of the variations on which have been based the descriptions of several supposedly distinct species. Certainly the color variations given by Crawford for *Aphalara artemisiæ* Forster, *A. angustipennis* Crawford, *A. viridis* Crawford, *A. pinicola* Crawford, and

³ Unless otherwise specified the numbers in parentheses are the collection numbers of E. W. Davis.

A. suaedæ Crawford are found in these specimens. Furthermore, with the exception of those for *A. angustipennis*, the measurements derived from these specimens might apply to any of the species here listed. Except for some variations in size, and this means gross size, the genitalia are said by Crawford to be similar for all of these species. This is a further indication of the possibility that the species are identical, since the genitalia, most frequently those of the male, are the most reliable single character separating the closely related species of this genus. From careful study of my specimens, both mounted and unmounted, and from Crawford's descriptions, I regard it as entirely probable that *A. viridis* Crawford, *A. pinicola* Crawford, and *A. suaedæ* Crawford are the same species. *A. angustipennis* Crawford may be a distinct but very closely related species, and *A. artemisiæ* Forster is probably a different but similarly a closely related species.

APHALARA PULCHELLA Crawford

1911, *Aphalara pulchella* Crawford. Pomona Journ. Ent., 3:480.

Specimens. One female from *Dipetalia linifolia* (Vahl), Las Vegas, Nevada, May 3, 1930 (323); and two males and one female from *Salsola pestifer* A. Nels., St. George, Utah, May 17, 1930 (360).

These specimens are in general agreement with the description of the species except for the dimensions of the female genitalia. The measurements of the two females at hand, both of which are mounted on slides, are .3 mm. and .35 mm. for the genital segments, .5 mm. and .6 mm. for the abdomens. In other words, the genital segment is scarcely one-half as long as the rest of the abdomen when the measurements are taken from specimens with the abdomen expanded instead of from specimens that have dried and hence shrunken.

Aphalara gutierreziae Klyver, n. sp.

Fig. 1, P

Specimens. Forty-four males and females from *Gutierrezia sarothrae* (Pursh), Las Vegas, Nevada, April 20, 1930 (228); thirty-seven males and females from the same host, Las Vegas, Nevada, May 3, 1930 (328); six females from the same host, Glendale, Nevada, May 18, 1930 (408); and, one male and one female from *Gutierrezia lucida* Greene, St. George, Utah, May 1, 1930 (292).

Types. Holotype, male, FK 224.1.1 ♂, from *Gutierrezia sarothræ* (Pursh), Las Vegas, Nevada, May 3, 1930 (328); allotype, female, FK 224.2.1 ♀.

Adult. Length to tip of folded wing, 2.2-2.5 mm.; length of body mounted on slide, 1.5-1.7 mm.; fore wing, 2.0-2.2 mm.; width of fore wing, .75-.8 mm.; width of head, .5-.6 mm. General color of all males at hand (twenty-one males) very constant; head and thorax black including eyes and antennæ, legs and abdomen green, fore wings very light brown with the veins darker brown, especially toward the apex. General color of the females slightly more variable; general green color with yellowish or light brown markings to a general light brown color throughout, wings with membrane light brown to darker brown with faint brown spots over the apical two-thirds, veins distinctly brown; tip of abdomen dark brown. Characters of the genus well developed.

Head slightly wider than prothorax, scarcely deflexed. Antennæ ten-segmented; one-fourth longer than width of head.

Thorax distinctly arched; the dorsum scarcely or very slightly pubescent, with very fine hair-like setæ. Posterior tibia with eight black teeth at the apex; two rather small claws on the basal tarsus of the hind legs. Anterior wings hyaline to very slightly opaque, somewhat fumate in the apical portion and faintly spotted apically, the veins usually distinctly brown; shape and venation very similar to that of *A. veaziei* Patch. Posterior wing very delicate in texture, beset throughout with very small punctations, the venation scarcely discernible, developed as irregular rows of minute punctations.

Abdomen with the plates moderately chitinized. Genitalia of the male (Fig. 1, P) relatively large; the "body"⁴ of the proctiger being about equal to its vertical length (p), the length of the lobes (l) slightly greater than p , the lobes wide at the base and subacute at the apex, being distinctly expanded dorsad in lateral aspect. Female genitalia very similar to those of *A. suaedæ* Crawford in every respect except for their slightly smaller size.

Nymph. Unknown.

Aphalara minutistylus Klyver, n. sp.

Fig. 1, G, L, M, N, O, I

Specimens. More than two hundred males and females from *Artemisia filifolia* Torr., St. George, Utah, April 21, 1930 (264).

⁴ The comparative measurements here indicated are taken as shown in Fig. 1, H and I; "p" is the greatest vertical length of the proctiger; "b" is the length of the "body" of the proctiger; and "l" is the length of the lobe of the proctiger measured from the posterior extremity of "b." The value of these comparative dimensions is apparent from a consideration of their application to the two proctigers illustrated.

Types. Holotype, female, FK 227.1.1 ♀, from *Artemisia filifolia* Torr., St. George, Utah, April 21, 1930 (264); allotype, male, FK 227.1.1 ♂.

Adult. Length to tip of folded wing: male 2.0 mm., female 2.5 mm.; length of body on slide: male 2.5 mm., female 2.6 mm.; length of fore wing: male 1.5 mm., female 2.0 mm.; width of head: male .5 mm., female .6 mm. General color of both males and females green to pale yellowish brown throughout, with white to pale brown markings on the thorax, apex of female genital segment very dark brown to black. Antennæ light colored with the tip slightly darkened. Fore wings slightly opaque with numerous sharply delimited dark brown spots, sometimes closely crowded on the apical third of the wing. Characters of the genus well developed.

Head as wide as thorax; somewhat deflexed. Antennæ ten-segmented, the third segment as long as the first and second combined; antennæ slightly but distinctly longer than the width of the head.

Thorax arched; without pubescence. Posterior tibia with five to six large black teeth at apex; two claws on the basal tarsus. Anterior wing (Fig. 1, L) slightly opaque, punctate over the entire membrane, with many brown spots (Fig. 1, M) distributed irregularly as shown in the figure; venation as shown in illustration. Posterior wing rather large but exceedingly delicate in structure, beset throughout with numerous very minute points, the venation scarcely discernible, developed as rows of points that are hardly visible even with the higher power of the microscope.

Abdomen with the dorsal plates somewhat more heavily chitinized than the ventral. Genitalia of the male (Fig. 1, N, O) relatively large; b of the proctiger very nearly equal to p , the lobes over one-fourth longer than p , of uniform width in lateral view and broadly rounded at the apex; the proctiger having two unusually large heavily chitinized, and meso-dorsally directed hooks at the base of the lobes; claspers distinctly longer than p . Genital segment of female scarcely more than one-half the length of the rest of the abdomen; the anterior half of the segment twice as thick as the posterior half, this being easily seen even in unmounted specimens studied with low magnifications (Fig. 1, G); the anterior half of the dorsal valve bearing a number of large setæ as illustrated; the apex of the dorsal valve being roughened and heavily chitinized, the ventral valve terminating in a strongly chitinized black apex.

Nymph. Unknown.

This species is evidently very closely similar to *A. angustipennis* Crawford. It is here described as a new species because of its smaller size; the different proportions of the fore wing; and the distinctive character of the male and, especially, the female genitalia. It differs in several important respects from *A. veaziei* Patch. It is clearly different from *A. veaziei metzaria* Crawford on the basis of the male, but more importantly the female genitalia, which are as distinctive or more so than those of any species in this difficult group.

APHALARA spp.

Specimens. One female from *Sophia pinnata* (Walt.) Howell, Ely, Nevada, May 19, 1930 (2531). One male from *Chrysothamnus speciosus* Nutt., seventeen miles northwest of Milford, Utah, May 15, 1930 (2502). One female from *Chrysothamnus speciosus* Nutt., Littlefield, Arizona, May 3, 1930 (342).

These three specimens are undeterminable without additional representation because of their somewhat fragmentary condition. Each represents a species different from the species in this and other collections of the writer.

Subgenus ANOMOCERA Crawford

1914, *Anomocera*, Crawford. U. S. Nat. Mus., Bull. 85:36-37.

This interesting group is represented by several specimens in this collection. The antennæ, upon casual observation, certainly appear to be but eight-segmented. The only perfect antenna in my material is suggestive of *two* very short segments being fused to the eighth segment instead of only one as indicated by Crawford.

APHALARA (ANOMOCERA) MINUTISSIMA Crawford

Fig. 1, J, K

1914, *Aphalara (Anomocera) minutissima* Crawford. U. S. Nat. Mus., Bull. 85:37; figs.

Specimens. One female from *Dipetalia linifolia* (Vahl), Las Vegas, Nevada, May 3, 1930 (323); two males and seven females from *Artemisia filifolia* Torr., St. George, Utah, April 21, 1930 (264).

Male genitalia with the proctiger of the general type represented by *Aphalara suaedæ* Crawford, but less robust, with the lobes relatively longer and bearing a number of stout, sharply

pointed setæ; the claspers, as illustrated (Fig. 1, J, K), nearly as long as the proctiger. Female genitalia similar to those of *A. suaedæ* Crawford, but somewhat larger, with the valves of the ovipositor more than usually extended posteriorly.

Genus APHALAROIDA Crawford

1914, *Aphalaroida* Crawford. U. S. Nat. Mus., Bull. 85:38.

This very interesting genus is represented by a single

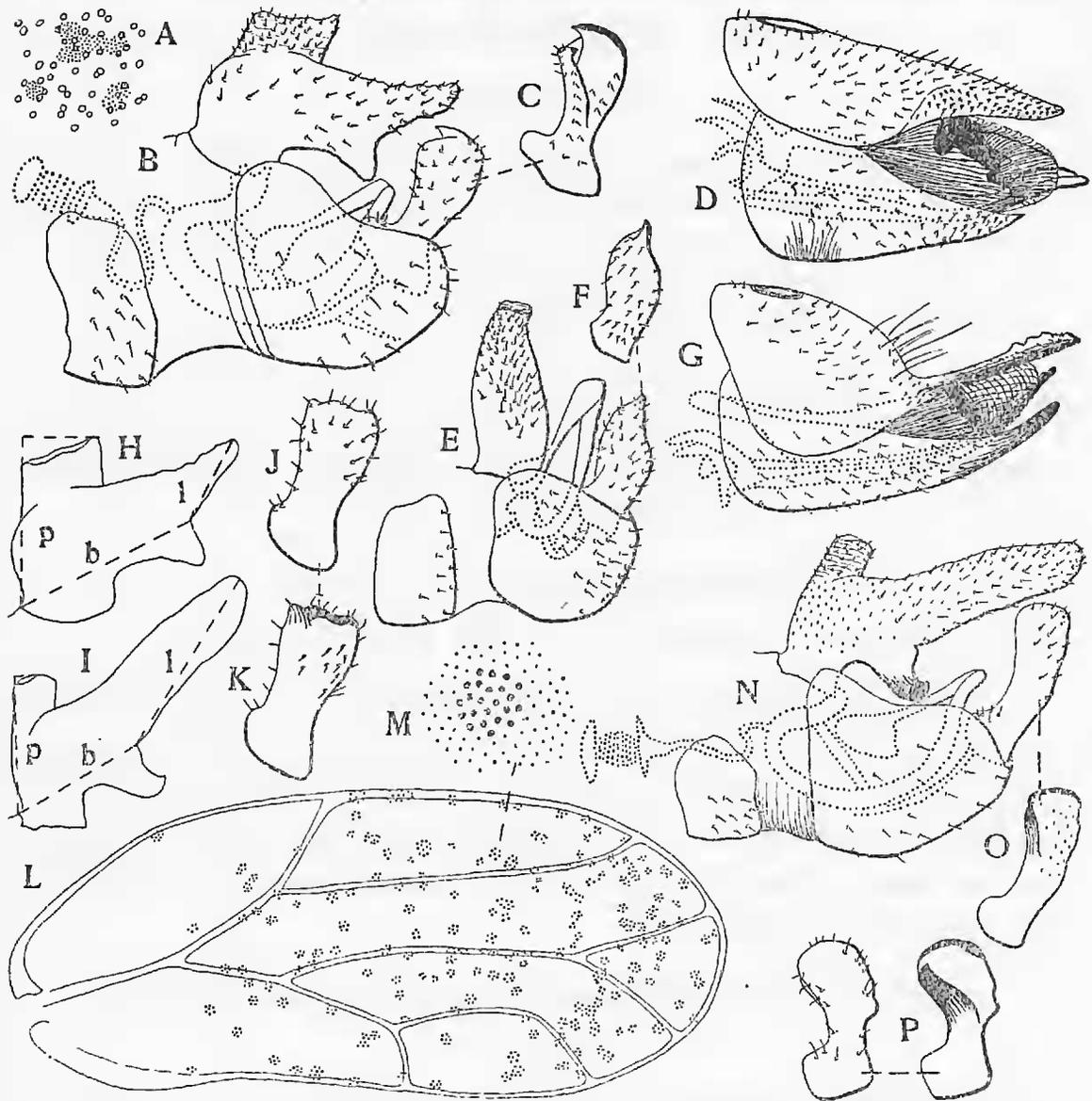


Fig. 1. *Aphalara suaedæ* Crawford—A, detail of fore wing; B, genitalia of male; C, inner face of clasper; D, genitalia of female; H, proctiger, illustrating method of taking measurements. *Psyllia breviata* Patch—E, male genitalia; F, inner face of clasper. *Aphalara minutistylus* n. sp.—G, genitalia of female; L, fore wing; M, detail of wing; N, genitalia of male; O, inner face of clasper; I, proctiger. *Aphalara gutierreziae* n. sp.—P, outer and inner aspects of clasper of male. *Aphalara (Anomocera) minutissima* Crawford—J, K, outer and inner aspects of clasper of male.

species and but a single, somewhat fragmentary male specimen. All but the first and second antennal segments are wanting, the posterior wings, and parts of all the legs except one posterior leg, which is complete, are wanting.

In many respects the specimen at hand fits Crawford's description of *Aphalaroida pithecolobia* Crawford, the generic type, particularly in the anterior wing form and in the male genitalia. In other respects it is closely similar to *A. inermis* Crawford, especially in wing coloration, which here seems significant.

Aphalaroida intermedia Klyver, n. sp.

Fig. 2, A, B, C, D, E, F, G, M

Specimen. A single male specimen from *Covillea tridentata* (D. C.), St. Thomas, Nevada, May 18, 1930 (405).

Type. Holotype, male, FK 233.1.1 ♂, from *Covillea tridentata* (D. C.), St. Thomas, Nevada, May 18, 1930 (405).

Adult. Length of body on slide, 2.1 mm.; width of head, .5 mm.; length of fore wing, 1.5 mm.; width of fore wing, .65 mm. General color pale brown throughout. Wings semiopaque, light brown.

Head (Fig. 2, M) slightly wider than width of thorax; eyes prominent; antennæ unknown; vertex and genæ bearing many large, blunt-ended setæ, the genæ bearing several other longer and sharply pointed setæ.

Thorax somewhat arched; the dorsum and the sides bearing many large setæ similar to those found elsewhere on the head, wings, and ventral plates of the abdomen. Legs with many large, chiefly sharply pointed setæ; apex of posterior tibia (Fig. 2, F) with three large black teeth mesally and a single large tooth and several large pointed setæ on the opposite side; basal tarsus with two relatively large black claws. Anterior wing having shape and venation as shown in illustration (Fig. 2, A); the wing membrane bearing large setæ similar to those found on the head, thorax, and ventral plates of abdomen, and having an intricate system of markings as illustrated (Fig. 2, B), more or less punctate over the entire membrane; five alar radulæ developed extensively, but rather feebly, in the two marginal cells, between R_1 and R_s , R_s and M_{1+2} , and M_{3+4} and Cu_1 (Figs. 2, A, C). Posterior wing unknown.

Abdomen with the plates quite heavily chitinized; the dorsal plates bearing an irregular row of small pointed setæ along the posterior margin; the ventral plates bearing many large setæ of the type found on the head, thorax, and fore wings. Male genitalia

(Fig. 2, D, E) moderate in size; the proctiger simple, somewhat elongate; the claspers about half as long as the proctiger, subrectangular in lateral aspect, the apex notched, the anterior process short, broadly rounded, the posterior process flattened on top. Female genitalia unknown.

Nymph. Unknown.

Aside from the difference in general proportions, differing from *A. pithecolobia* Crawford, to which it is apparently closely related, in the pronotum being distinctly arched; in the anterior wing being conspicuously spotted, with the *wing membrane* bearing relatively large setæ, set biserially with the veins but always on the wing membrane at some distance from the veins (Fig. 2, A, B, C, G). Similar to *A. pithecolobia* Crawford in the proctiger of the male being considerably longer than the claspers, the proctiger being relatively stout instead of very long and slender as in that species.

The general appearance of the anterior wing is apparently similar to that of *A. inermis* Crawford. On the other hand, the specimen at hand differs from that species in the following particulars: in the fore wing being relatively broader and less rhomboidal; in the white markings of the fore wing being uniform in size and distributed over the entire wing surface; in the presence of small white areas at the ends of R_s , M_{1+2} , and M_{3+4} , and Cu_1 , and a small but very noticeable dark brown spot at the end of Cu_2 (Fig. 2, A); and in the pterostigmal vein (R_1) being more complete, delimiting a longer pterostigmal area.

Subfamily PAUROPSYLLINÆ

Genus HETEROPSYLLA Crawford

1914, *Heteropsylla* Crawford. U. S. Nat. Mus., Bull. 85:44.

This genus is represented by over three hundred adult specimens of *Heteropsylla texana* Crawford, the type of the genus, and by two last-stage nymphs of this species.

HETEROPSYLLA TEXANA Crawford

Fig. 2, N

Specimens. More than three hundred adult males and females and two last-stage nymphs from *Prosopis glandulosa* Torr., Overton,

Nevada, May 2, 1930 (315); and, adults only, from *Artemisia dracunculoides* Pursh, St. George, Utah, May 3, 1930 (347); from *Sophia pinnata* (Walt.) Howell, Ely, Nevada, May 19, 1930 (2530); from *Pluchea sericea* (Nutt.) Coville, Glendale, Nevada, May 3, 1930 (338); from *Corton longipes* Jones, Littlefield., Arizona, May 3, 1930 (340); from *Covillea tridentata* (D. C.), Littlefield, Arizona, May 3, 1930 (344); and from *Chrysothamnus speciosus* Nutt., Littlefield, Arizona, May 3, 1930 (342).

In all of the more important characters my specimens agree very closely with Crawford's description of the species. In coloration they differ considerably, there being a predominance of bright green color in the abdomen and frequently over the entire body in the long series of specimens before me. In several instances of specimens with the head, thorax, and the dorsum of the abdomen nearly black the abdomen is dark, yet distinctly green on the ventral side.

Aside from the coloration the morphology of the fore and hind wings is noteworthy. The membrane of the anterior wing is covered with small points, the alar radulæ being feebly developed in the two marginal cells and between M_{3+4} and Cu_1 ; the veins bearing small setæ; and the pterostigma is thickened and beset with numerous punctations. The posterior wing is exceedingly delicate in texture, the venation being scarcely discernible with the compound microscope, consisting of a series of minute punctations arranged in two rows; the antero-proximal margin bearing a number of relatively large, stout, setæ.

The claspers of the male are deeply notched at the apex, with the posterior process somewhat longer than the anterior, as described by Crawford, but neither is, strictly speaking, acute at the apex (Fig. 2, N). The anterior process is roundly pointed; the posterior process is flattened at the apex and has a small antero-mesally directed hook as shown in the illustration.

Nymph. The immature stage in my material will be described in the series of short papers by the writer devoted to the descriptions of the immature stages of generic types and others of special interest.⁵

⁵ 1930, Notes on the Chermidæ. Part I. Can. Ent., 62:167-175; pl. 14; 1930, Part II. Ibid. In press.

Subfamily TRIOZINÆ
Genus PARATRIOZA Crawford

This genus is represented by one commonly known species. The information here given extends the description by Crawford in several important details.

PARATRIOZA COCKERELLI Sulc.

Fig. 2, H, I, J

1909, *Paratrioza cockerelli* Sulc. Acta Soc. Ent. Bohemiæ, 6:102-109.

1914, *Paratrioza cockerelli* Sulc. Crawford, U. S. Nat. Mus., Bull. 85:71-72; figs.

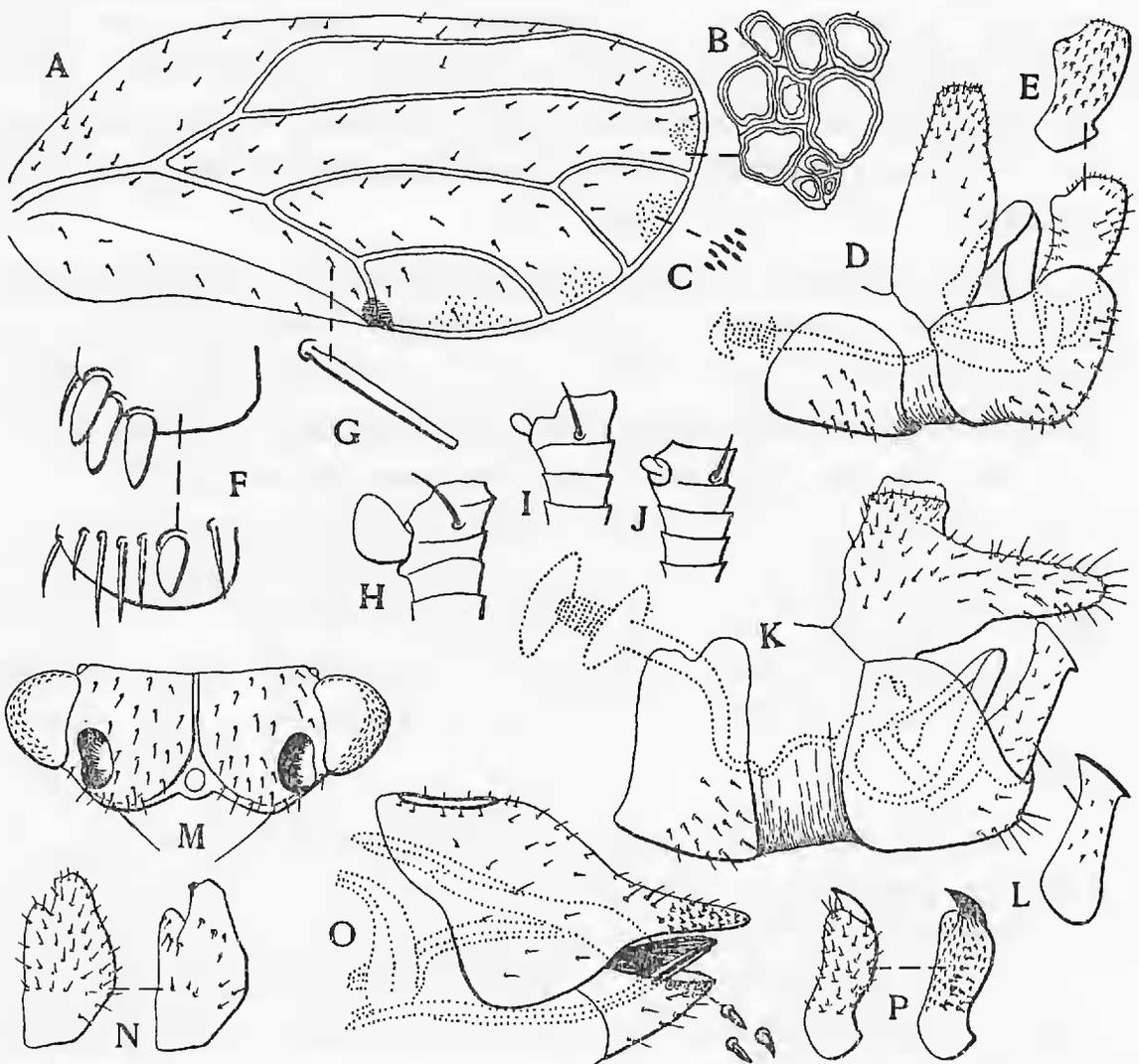


Fig. 2. *Aphalaroida intermedia* n. sp.—A, fore wing; B, detail of wing membrane; C, alar radulæ; D, genitalia of male; E, inner face of clasper; F, inner and outer aspects of apex of posterior tibia; G, seta of wing membrane; M, head. *Paratrioza cockerelli* Sulc—H, I, and J, distal ends of fourth, sixth, and eighth antennal segments, respectively. *Trioza lobata* Crawford—K, genitalia of male; L, inner face of clasper. *Heteropsylla texana* Crawford—N, outer and inner aspects of clasper of male. *Psyllia minuta* Crawford—O, genitalia of female; P, outer and inner aspects of clasper of male.

Specimens. Numerous males and females; from *Covillea tridentata* (D. C.), Glendale, Nevada, April 20, 1930, May 3, 1930 (242; 332, 330); from *Erigeron trichopes* Torr., Glendale, Nevada, May 3, 1930 (331); from *Chrysothamnus paniculatus* (A. Gray), Glendale, Nevada, May 3, 1930 (333); from *Hymenoclea salsola* Torr. and Gray, Las Vegas, Nevada, April 20, 1930 (219); from *Norta altissima* (L.) Britton, Milford, Utah, May 20, 1930 (2557); from *Chrysothamnus speciosus* Nutt., St. George, Utah, May 1, 1930 (282); from *Lepidium scopularum* Jones, Garrison, Nevada, May 15, 1930 (2509); from the same host, Tonopah, Nevada, May 18, 1930 (2525, 2526); and from *Sophia pinnata* (Walt.), Ely, Nevada, May 19, 1930 (2528, 2530, 2531).

Observations with the compound microscope (100 x and 440 x) reveal the very interesting and unusual structure on antennal segment four which has been mentioned by Crawford. In addition to the one on this segment, however, similar though smaller structures are found on segments six and eight as illustrated in Fig. 2, H, I, J.

The posterior wing of this species, hitherto undescribed, is very thin, transparent, and delicately membraneous with the venation obscure, the veins present as a single row of minute, rather widely spaced punctations, the membrane covered throughout with exceedingly fine punctations.

TRIOZA LOBATA Crawford

Fig. 2, K, L

1914, *Trioza lobata* Crawford. U. S. Nat. Mus., Bull. 85:86-87; figs.

Specimen. One adult male from *Chrysothamnus speciosus* Nutt., Panaca, Nevada, May 19, 1930 (2538).

This species is represented by a single imperfect specimen, of which the antennæ are wanting. There can, however, be no question as to its identity because of the distinctive anterior wings and other characters.

The alar radulæ of the anterior wings are moderately developed in the two marginal cells and between M and Cu₁. Posterior wings relatively large, very thin and membraneous, with the venation weakly developed as irregularly set single and double rows of punctations, and with the general surface of the membrane beset with minute points arranged in circles of varying sizes suggesting lacework.

Male genitalia (Fig. 2, K, L) as described by Crawford. His figures of the genitalia lack definiteness and clearness.

(To be Continued)